

FORM PTO-1300  
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U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

ATTORNEY'S DOCKET NUMBER

764-25397 US

TRANSMITTAL LETTER TO THE UNITED STATES  
DESIGNATED/ELECTED OFFICE (DO/EO/US)  
CONCERNING A FILING UNDER 35 U.S.C. § 371

U.S. APPLICATION NO. (If known, give 35 CFR 1.5)

09/806211

INTERNATIONAL APPLICATION NO. □  
PCT/EP99/08518INTERNATIONAL FILING DATE  
06 November 1999PRIORITY DATE CLAIMED  
11 November 1998TITLE OF INVENTION Method for Operation of Transmitting and Receiving Devices  
in a Control System for One or More Rooms in a Building

APPLICANT(S) FOR DO/EO/US

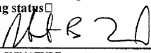
Manfred Keller; Renke Bienert; Fritz Jauss

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

- 1 ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. § 371 □
- 2 ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. § 371 □
- 3 ☒ This is an express request to begin national examination procedures (35 U.S.C. § 371(f)) □ The submission must include items (5), (6), (9) and (21) indicated below □
- 4 ☒ The US has been elected by the expiration of 19 months from the priority date (Article 31) □
- 5 ☒ A copy of the International Application as filed (35 U.S.C. § 371(c)(2)) □  
a ☐ is attached hereto (required only if not communicated by the International Bureau) □  
b ☒ has been communicated by the International Bureau □  
c ☐ is not required, as the application was filed in the United States Receiving Office (RO/US) □
- 6 ☒ An English language translation of the International Application as filed (35 U.S.C. § 371(c)(2)) □  
a ☒ is attached hereto □  
b ☐ has been previously submitted under 35 U.S.C. § 54(d)(4) □
- 7 ☐ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. § 371(c)(3)) □  
a ☐ are attached hereto (required only if not communicated by the International Bureau) □  
b ☐ have been communicated by the International Bureau □  
c ☐ have not been made; however, the time limit for making such amendments has NOT expired □  
d ☐ have not been made and will not be made □
- 8 ☐ An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. § 371(c)(3)) □
- 9 ☒ An oath or declaration of the inventor(s) (35 U.S.C. § 371(c)(4)) □
- 10 ☐ An English language translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. § 371(c)(5)) □

## Items 11 to 20 below concern document(s) or information included:

- 11 ☐ An Information Disclosure Statement under 37 CFR 1.97 and 1.98 □
- 12 ☒ An assignment document for recording □ A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included □
- 13 ☐ A **FIRST** preliminary amendment □
- 14 ☐ A **SECOND** or **SUBSEQUENT** preliminary amendment □
- 15 ☐ A substitute specification □
- 16 ☐ A change of power of attorney and/or address letter □
- 17 ☐ A computer-readable form of the sequence listing in accordance with PCT Rule 13ter2 and 35 U.S.C. § 821 - 1.825 □
- 18 ☐ A second copy of the published international application under 35 U.S.C. § 54(d)(4) □
- 19 ☐ A second copy of the English language translation of the international application under 35 U.S.C. § 54(d)(4) □
- 20 ☐ Other items or information:

US APPLICATION NO. <b>09/806211</b> INTERNATIONAL APPLICATION NO.	ATTORNEY'S DOCKET NUMBER																																																
21 <input checked="" type="checkbox"/> The following fees are submitted: <b>BASIC NATIONAL FEE (37 CFR 1.992 (a) (1) - (5)):</b> Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO <input type="checkbox"/> \$1000.00 International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO <input type="checkbox"/> \$860.00 International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO <input type="checkbox"/> \$710.00 International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4) <input type="checkbox"/> \$690.00 International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4) <input type="checkbox"/> \$100.00 <b>ENTER APPROPRIATE BASIC FEE AMOUNT =</b>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="2" style="text-align: left;">CALCULATIONS PTO USE ONLY</th> </tr> <tr> <td style="width: 70%;"></td> <td style="width: 30%;"></td> </tr> <tr> <td></td> <td style="text-align: right;">\$ 860.00</td> </tr> <tr> <td colspan="2">Surcharge of \$130.00 for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(e)) <input type="checkbox"/></td> </tr> <tr> <td></td> <td style="text-align: right;">\$</td> </tr> <tr> <td>CLAIMS</td> <td style="text-align: right;">NUMBER FILED</td> </tr> <tr> <td></td> <td style="text-align: right;">NUMBER EXTRA</td> </tr> <tr> <td></td> <td style="text-align: right;">RATE</td> </tr> <tr> <td>Total claims</td> <td style="text-align: right;">6 - 20 = 0 x \$18.00</td> </tr> <tr> <td>Independent claims</td> <td style="text-align: right;">1 - 3 = 0 x \$80.00</td> </tr> <tr> <td>MULTIPLE DEPENDENT CLAIM(S) (if applicable)</td> <td style="text-align: right;">+ \$270.00</td> </tr> <tr> <td colspan="2"><b>TOTAL OF ABOVE CALCULATIONS =</b></td> </tr> <tr> <td colspan="2" style="text-align: right;">\$ 1,130.00</td> </tr> <tr> <td colspan="2"> <input type="checkbox"/> Applicant claims small entity status <input type="checkbox"/> See 37 CFR 1.27 <input type="checkbox"/> The fees indicated above are reduced by 1/2 <input type="checkbox"/> </td> </tr> <tr> <td colspan="2" style="text-align: right;"><b>SUBTOTAL =</b></td> </tr> <tr> <td colspan="2" style="text-align: right;">\$</td> </tr> <tr> <td colspan="2">Processing fee of \$130.00 for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f)) <input type="checkbox"/></td> </tr> <tr> <td colspan="2" style="text-align: right;"><b>TOTAL NATIONAL FEE =</b></td> </tr> <tr> <td colspan="2" style="text-align: right;">\$ 1,130.00</td> </tr> <tr> <td colspan="2">Fee for recording the enclosed assignment (37 CFR 1.21(h)) <input type="checkbox"/> The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) <input type="checkbox"/> \$40.00 per property +</td> </tr> <tr> <td colspan="2" style="text-align: right;"><b>TOTAL FEES ENCLOSED =</b></td> </tr> <tr> <td colspan="2" style="text-align: right;">\$ 1,130.00</td> </tr> <tr> <td colspan="2" style="text-align: right;">Amount to be refunded: \$</td> </tr> <tr> <td colspan="2" style="text-align: right;">charged: \$</td> </tr> </table>	CALCULATIONS PTO USE ONLY					\$ 860.00	Surcharge of \$130.00 for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(e)) <input type="checkbox"/>			\$	CLAIMS	NUMBER FILED		NUMBER EXTRA		RATE	Total claims	6 - 20 = 0 x \$18.00	Independent claims	1 - 3 = 0 x \$80.00	MULTIPLE DEPENDENT CLAIM(S) (if applicable)	+ \$270.00	<b>TOTAL OF ABOVE CALCULATIONS =</b>		\$ 1,130.00		<input type="checkbox"/> Applicant claims small entity status <input type="checkbox"/> See 37 CFR 1.27 <input type="checkbox"/> The fees indicated above are reduced by 1/2 <input type="checkbox"/>		<b>SUBTOTAL =</b>		\$		Processing fee of \$130.00 for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f)) <input type="checkbox"/>		<b>TOTAL NATIONAL FEE =</b>		\$ 1,130.00		Fee for recording the enclosed assignment (37 CFR 1.21(h)) <input type="checkbox"/> The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) <input type="checkbox"/> \$40.00 per property +		<b>TOTAL FEES ENCLOSED =</b>		\$ 1,130.00		Amount to be refunded: \$		charged: \$	
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NOTE: Where an appropriate time limit under 37 CFR 1.994 or 1.995 has not been met, a petition to revive (37 CFR 1.137 (a) or (b)) must be filed and granted to restore the application to pending status <input type="checkbox"/>																																																	
SEND ALL CORRESPONDENCE TO Robert B. Leonard Honeywell International Inc. 101 Columbia Road Morristown, NJ 07962																																																	
SIGNATURE  Robert B. Leonard NAME 33,946 REGISTRATION NUMBER																																																	

**Method for operation of transmitting and receiving  
devices in a control system for one or more rooms in a  
building**

5           The invention relates to a method for operation  
of transmitting and receiving devices in a control  
system for one or more rooms in a building, as claimed  
in the preamble of patent claim 1.

10           The temperature in one or more rooms in a  
building is normally controlled or regulated by means  
of control systems. The control systems have at least  
one control center and at least two components  
connected to the control center. The components include  
15           temperature regulators, heating devices, lighting  
devices and the like. The control center and the  
components have transmitting devices and/or receiving  
devices in order to interchange data between them.

20           To ensure reliable data interchange between the  
transmitting devices and the receiving devices, the  
receiving devices would in principle have to be  
switched on continuously, but this would result in a  
large amount of energy being consumed. This is  
particularly disadvantageous for battery-powered  
25           receiving devices since, in this case, the battery used  
to power the receiving device would be discharged  
within a short time.

30           Against this background, the present invention  
is based on the problem of providing an energy-saving  
and efficient method for operation of transmitting and  
receiving devices in a control system for one or more  
rooms in a building.

          In order to solve this problem, the method  
mentioned initially is distinguished by the features of  
claim 1.

35           Preferred developments of the invention result  
from the dependent claims and the description. An  
exemplary embodiment of the invention will be explained

in more detail in the following text with reference to the drawings, in which:

Figure 1 shows a block diagram of a control system, and

- 5 Figure 2 shows, in schematic form, activation states of a transmitting device and receiving device operated according to the invention.

The control system illustrated in figure 1 is used to regulate or control the temperature level  
10 individually in one or more rooms in a building. Furthermore, such a control system is also used to control the lighting and to control the roller shutters.

Figure 1 shows the layout of a control system  
15 with a control center 10 and a number of components. The control center 10 is also referred to as the apartment manager. The components comprise various assemblies. Temperature regulators 11 are thus provided, using which the temperature level in a room  
20 can be monitored, and which are used to adjust the temperature level setting via an appropriate adjusting element 12.

Heating devices 13 are also provided as components. Figure 1 shows, in schematic form,  
25 electronic radiator valves as heating devices 13, using which the heating power or heat emission from such radiators can be adjusted. However, it is possible to provide any desired heating devices. By way of example, figure 1 shows an underfloor heating regulator 14 for  
30 adjusting the heating power from an underfloor heating system.

Lighting devices 15 and roller shutters 16 are shown as further components in the control system. Furthermore, heating-cost distributors 17 are provided,  
35 using which the heating power produced by the heating devices 13 can be monitored and evaluated.

In the control system shown in figure 1, the components 11, 13, 14, 15, 16 and 17 are connected to

the control center 10 by radio. The control center 10 accordingly interchanges information or data with the components 11, 13, 14, 15, 16 and 17. The data interchange is indicated in figure 1 by arrows 18. The direction of the arrows 18 indicates the signal flow direction of the data signals between the components 11, 13, 14, 15, 16, 17 and the control center 10. This clearly shows that signal transmission is unidirectional in this case.

In order to transmit the signals, each component 11 and the control center 10 have associated transmitting devices 19. In order to receive signals, the components 13, 14, 15, 16, and the control center 10 have associated receiving devices 20. Reference should be made to the Patent Application, submitted by the same applicant and with the official reference 197 57 235, for details relating to the exact construction of the transmitting devices 19 and receiving devices 20, and with respect to collision-free signal transmission between the components 11, 13, 14, 15, 16, 17 and the control center 10.

The receiving devices 20 are activated, optimized to save energy, using the method according to the invention as described in the following text in conjunction with figure 2. Figure 2 thus shows three activation profiles 21, 22 and 23, in schematic form. The activation profile 21 is the activation profile for the transmitting devices 19. The activation profile 22 is an activation profile for the receiving devices 20 during so-called normal operation. The activation profile 23, on the other hand, is an activation profile for the receiving devices 20 during so-called synchronization operation.

As can be seen from figure 2, a receiving device 20 is not activated continuously, but for a predetermined time period at predetermined time intervals. The time activation profile 22 for a receiving device 20 in normal operation thus shows that

the receiving device 20, for example, is activated for a time period of, for example, 300 milliseconds every four minutes. These activation times for the receiving device 20 are synchronized to a transmission signal for data signals from a corresponding transmitting device 19. The data signals transmitted by the transmitting device 19 and which can be received by the receiving device 20 are denoted by N in the activation profile 21. Comparison of the activation profiles 21 and 22 immediately shows that the time interval and the time period for activation of the receiving device are synchronized to the time interval and the transmission duration of the data signals from the transmitting device 19.

For synchronizing, the transmitting device 19 transmits to the corresponding receiving device 20 a synchronization signal which is denoted by S in the time activation profile 21 in figure 2. For this purpose, the synchronization signal S includes information about the time interval between the data signals N transmitted by the transmitting device 19.

If the control system contains different transmitting devices and receiving devices, then, as a rule, they transmit and receive at different time intervals. The time intervals preferably depend on a unique appliance number. The logic association between the transmitting devices 19 and receiving devices 20 which communicate with one another is in this case produced by means of addresses which are included in the synchronization signal S and data signal N.

If, for example, as a result of a fault, the synchronization between the transmitting device 19 and the receiving device 20 is lost, or synchronization is required on starting up the control system, the receiving device 20 is operated in accordance with the time activation profile 23 in figure 2. In this case, a receiving device 20 thus remains activated until the receiving device 20 has received a corresponding

synchronization signal S. In order to ensure that the time period for synchronization is as short as possible, the synchronization signal S is, according to the invention, transmitted during the time interval of the transmitted data signals N, specifically at the halfway point during the time interval. This can be seen from the time activation profile 21 for the transmitting device 19 in figure 2. This shows that the data signals N are transmitted every four minutes. A synchronization signal is transmitted precisely halfway through these four minutes.

The method according to the invention thus allows the receiving devices/transmitting devices to be operated to optimize energy saving. If - as described in the example above - a receiving device is activated for 300 milliseconds only every four minutes, then this results in the energy consumption being 1/800th of the energy consumption which would be required if the receiving device were activated continuously.

List of reference symbols

- 10 Control center
- 11 Temperature regulator
- 12 Adjusting element
- 13 Heating device
- 14 Underfloor heating regulator
- 15 Lighting device
- 16 Roller shutter
- 17 Heating cost distributor
- 18 Arrow
- 19 Transmitting device
- 20 Receiving device
- 21 Activation profile
- 22 Activation profile
- 23 Activation profile



Patent Claims:

1. A method for operation of transmitting and receiving devices in a control system for one or more  
5 rooms in a building, comprising the following measures:
- a) the or each transmitting device (20) transmits data signals (N), to be received by the or each receiving device (19), in a predetermined transmission cycle, specifically with a  
10 predetermined time interval and with a predetermined transmission duration,
- b) the or each receiving device (19) is activated at a predetermined time interval and for a predetermined time period, with the time interval and the time period for the or each receiving device (19) being synchronized to the transmission cycle of the or each transmitting device (20),  
15
- c) the or each transmitting device (20) transmits a synchronization signal (S), in addition to data signals (N), to the or each corresponding receiving device (19), with the synchronization signal (S) including information about the time interval between the transmitted data signals (N),  
20
- d) the transmitting devices (20) and receiving devices (19) which communicate with one another are allocated via addresses which are included in the synchronization signal (S) and data signal (N).  
25
2. The method as claimed in claim 1, **wherein** the synchronization signal (S) is transmitted at the  
30 halfway point during the time interval of the transmitted data signals (N).
3. The method as claimed in claim 1 or 2, **wherein**, for synchronization, the or each receiving device (19)  
35 is activated until it receives the corresponding

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synchronization signal (S) from the corresponding  
transmitting device (20).

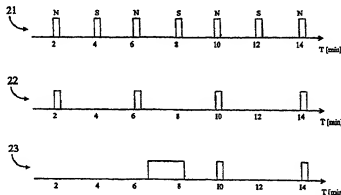


INTERNATIONALE ANMELDUNG VERÖFFENTLICHT NACH DEM VERTRAG ÜBER DIE  
INTERNATIONALE ZUSAMMENARBEIT AUF DEM GEBIET DES PATENTWESENS (PCT)

<p>(51) Internationale Patentklassifikation 7 : <b>H04Q 9/04, G08C 17/02, H04B 1/16</b></p>	<p><b>A1</b></p>	<p>(11) Internationale Veröffentlichungsnummer: <b>WO 00/28776</b></p> <p>(43) Internationales Veröffentlichungsdatum: 18. Mai 2000 (18.05.00)</p>
<p>(21) Internationales Aktenzeichen: PCT/EP99/08518</p> <p>(22) Internationales Anmeldedatum: 6. November 1999 (06.11.99)</p> <p>(30) Prioritätsdaten: 198 51 959.1 11. November 1998 (11.11.98) DE</p> <p>(71) Anmelder (für alle Bestimmungsstaaten ausser US): HONEYWELL AG [DE/DE]; Kaiserleistrasse 39, D-63067 Offenbach am Main (DE).</p> <p>(72) Erfinder; und</p> <p>(75) Erfinder/Anmelder (nur für US): KELLER, Manfred [DE/DE]; Blumenstrasse 14, D-96242 Sonnefeld (DE); BIENERT, Renke [DE/DE]; Schwabenstrasse 51, D-71101 Schönaich (DE). JAUSS, Fritz [DE/DE]; Cheruskerstrasse 56, D-71101 Schönaich (DE); <i>DET</i></p> <p>(74) Anwalt: HERZBACH, Dieter; Honeywell Holding AG, Patent- und Lizenzabteilung, Kaiserleistrasse 39, D-63067 Offenbach am Main (DE).</p>		<p>(81) Bestimmungsstaaten: AL, AU, BA, BB, BG, BR, CA, CN, CU, CZ, EE, GE, HU, IL, IS, JP, KR, LC, LK, LT, LV, MK, MN, MX, NO, NZ, PL, RO, SG, SI, SK, TR, TT, UA, US, UZ, VN, ARIPO Patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), eurasisches Patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), europäisches Patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI Patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).</p> <p><b>Veröffentlicht</b> Mit internationalem Recherchenbericht. Vor Ablauf der für Änderungen der Ansprüche zugelassenen Frist; Veröffentlichung wird wiederholt falls Änderungen eintreffen.</p>

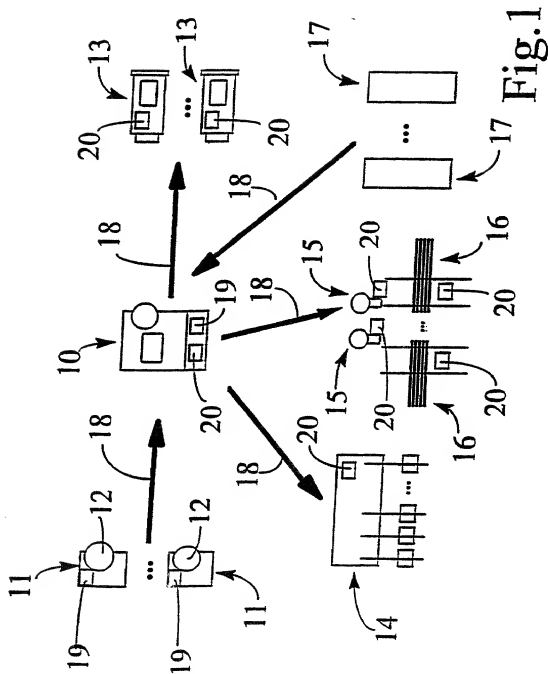
(54) Title: METHOD FOR OPERATING TRANSMITTER AND RECEIVER UNITS IN A CONTROL SYSTEM FOR ONE OR SEVERAL ROOMS IN A BUILDING

(54) Bezeichnung: VERFAHREN ZUM BETREIBEN VON SENDE- UND EMPFANGSEINRICHTUNGEN IN EINEM LEITSYSTEM FÜR EINEN ODER MEHRERE RÄUME EINES GEBÄUDES



(57) Abstract

The invention relates to a method for operating transmitter and receiver units in a control system for one or several rooms in a building. In order to ensure power-optimized activation for each receiver unit in the control system, one or each receiver unit is activated at a specific interval in time, whereby said interval in time is synchronized with a transmission cycle of a corresponding transmission unit. One or each transmission unit transmits a synchronization signal to one or each receiver unit, containing information relating to the interval in time when data signals are transmitted.



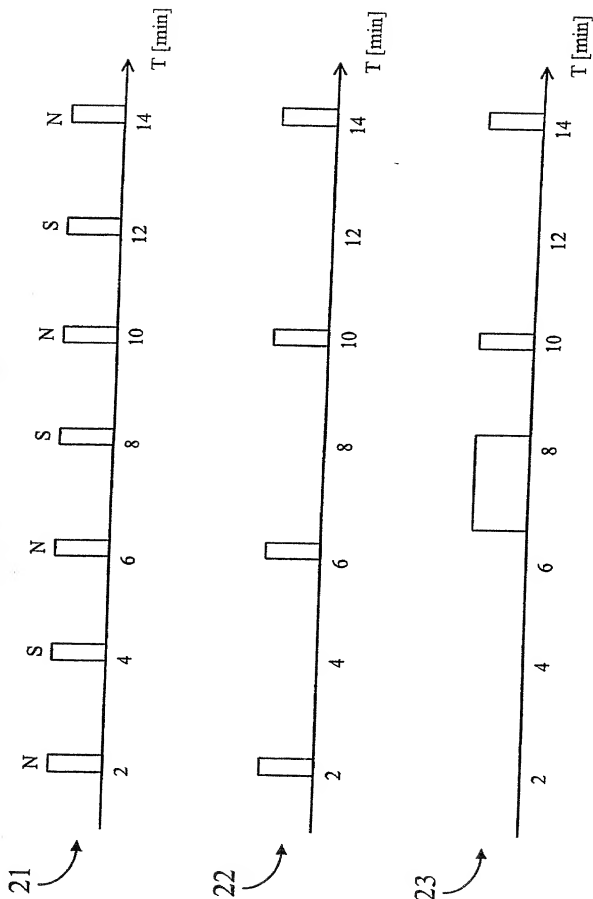


Fig. 2

## Declaration and Power of Attorney

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name;

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

METHOD FOR OPERATION OF TRANSMITTING AND RECEIVING  
 DEVICES IN A CONTROL SYSTEM FOR ONE OR MORE ROOMS IN A BUILDING

The specification of which

(check one) is attached hereto  
X was filed on 06 November 1999  
 Application Serial No. PCT/EP99/08518  
 And was amended on \_\_\_\_\_  
 (if applicable)

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).\*

I hereby claim foreign priority benefits under Title 35, United States Code §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)

**Priority  
 Claimed**

(Number)	(Country)	(Day/Month/Year Filed)	Yes	No
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I hereby claim the benefit under Title 35, United States Code §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations §1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

(Application Serial No.)	(Filing Date)	(Status) (patented, pending, abandoned)
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As named inventors, we hereby appoint the registered practitioner(s) under Customer Number 000128 to prosecute this application and to transact all business in the Patent and Trademark Office herewith.

Direct all correspondence to: Customer I.D. No. 000128

Direct all telephone calls to: Robert B. Leonard 763-954-5389

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full Name of Sole

or Joint Inventor

Manfred Keller

Inventor's Signature

Manfred Keller

Date

17.07.2001

Citizenship

German

Post Office Address

Blumenstrasse 14, D-96242

Sonnefeld, Germany

Full Name of

Joint Inventor if any

Renke Bienert

Inventor's Signature

Renke Bienert

Date

17.07.2001

Citizenship

German

Post Office Address

Schwabenstrasse 51, D-71101

Schönaich, Germany

Full Name of

Joint Inventor if any

Fritz Jauss

Inventor's Signature

Fritz Jauss

Date

17.01.2001

Citizenship

German

Post Office Address

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\*Title 37, Code of Federal Regulations §1.56:

(a) A patent by its very nature is affected with a public interest. The public interest is best served, and the most effective patent examination occurs when, at the time an application is being examined, the Office is aware of and evaluates the teachings of all information material to patentability. Each individual associated with the filing and prosecution of a patent application has a duty of candor and good faith in dealing with the Office, which includes a duty to disclose to the Office all information known to that individual to be material to patentability as defined in this section. The duty to disclose information exists with respect to each pending claim until the claim is cancelled or withdrawn from consideration, or the application

becomes abandoned. Information material to the patentability of a claim that is cancelled or withdrawn from consideration need not be submitted if the information is not material to the patentability of any claim remaining under consideration in the application. There is no duty to submit information which is not material to the patentability of any existing claim. The duty to disclose all information known to be material to patentability is deemed to be satisfied if all information known to be material to patentability of any claim issued in a patent was cited by the Office or submitted to the Office in the manner prescribed by §§ 1.97(b)-(d) and 1.98. However, no patent will be granted on an application in connection with which fraud on the Office was practiced or attempted or the duty of disclosure was violated through bad faith or intentional misconduct. The Office encourages applicants to carefully examine:

(1) prior art cited in search reports of a foreign patent office in a counterpart application, and

(2) the closest information over which individuals associated with the filing or prosecution of a patent application believe any pending claim patentably defines, to make sure that any material information contained therein is disclosed to the Office.

(b) Under this section, information is material to patentability when it is not cumulative to information already of record or being made of record in the application, and

(1) It establishes, by itself or in combination with other information, a prima facie case of unpatentability of a claim; or

(2) It refutes, or is inconsistent with, a position the applicant takes in:

(i) Opposing an argument of unpatentability relied on by the Office, or

(ii) Asserting an argument of patentability.

A prima facie case of unpatentability is established when the information compels a conclusion that a claim is unpatentable under the preponderance of evidence, burden-of-proof standard, giving each term in the claim its broadest reasonable construction consistent with the specification, and before any consideration is given to evidence which may be submitted in an attempt to establish a contrary conclusion of patentability.

(c) Individuals associated with the filing or prosecution of a patent application within the meaning of this section are:

(1) Each inventor named in the application;

(2) Each attorney or agent who prepares or prosecutes the application; and

(3) Every other person who is substantively involved in the preparation or prosecution of the application and who is associated with the inventor, with the assignee or with anyone to whom there is an obligation to assign the application.

(d) Individuals other than the attorney, agent or inventor may comply with this section by disclosing information to the attorney, agent, or inventor.